

## THE SION PROCEDURE A NEW PROCEDURE FOR EVALUATION OF TUBAL STATUS

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### SUMMARY

Endovaginal ultrasound has the potential to affect the way we practice medicine on many different levels. Initially, even the developers of the new technology saw it as a specialised extension of current imaging technique and practice patterns. The more one uses and explores endovaginal ultrasound, the more one sees that certain of its applications will be far more advantageous than previously available techniques. Endosonography as a tool for checking the patency of fallopian tubes was an expected development in the giant strides of progress the field of gynaecology was taking. The sion procedure is offered not as a substitute for hysterosalpingography, laparoscopy, hysteroscopy or salpingoscopy but as an office-screening technique which is cheap, minimally invasive and one which would be complimentary to the armamentarium of infertility investigations already available. We have 67 patients on whom an HSG, a diagnostic laparoscopy and our procedure have been done. We find our procedure an excellent tool for investigating the tubal status.

### INTRODUCTION

It was only by trial and error that we could use transvaginal ultrasound in investigating the tubal status including tubal patency and formulating standard protocols for the same.

Prior to the accurate anatomical description of the human fallopian tubes by Gabrielle Falloppio, the concepts about the tubes were imaginary, vague and erratic. Once the anatomy

was understood, physiology was bound to attract attention. Patency of the tubes was the earliest and until recent decades the only aspect of tubal function that was studied and evaluated. The beginning of this century was marked by the development of diagnostic procedures for tubal patency and pathology with the introduction of hysterosalpingography, tubal pertubation and laparoscopy. Radiological studies complement endoscopic investigations as each provides information, albeit with a varying degree of accuracy, about one or more segments of the oviduct, and each can also be used to

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*Accepted for Publication on 17/09/1992.*

confirm the findings of the other. Endosonography as a tool for checking the patency of fallopian tubes was an expected development in the giant strides of progress the field of gynaecology was taking. "The Sion Test" used transvaginal sonography to evaluate tubal patency. (Allahbadia et al, 1991). But one question that was not answered by this test was the status of the fallopian tubes; the mobility and the "milieu exterior". The Sion Procedure effectively solves all the unanswered questions about "The Sion Test". The nondistended fallopian tube is difficult to depict on endovaginal sonography, probably because of its small intraluminal size and serpiginous course. Occasionally, one can identify the origin of the tubes by finding the invagination of endometrium depicting the area of the tubal ostia and following these structures laterally in the axial or coronal plane. The ovarian and infundibulopelvic ligaments usually cannot be depicted. Sonographic delineation of the tubes is facilitated by intraperitoneal fluid that may be present in the cul-de-sac. By placing the patient in a reverse Trendelenberg position, the fluid can be collected around the tube. Endosonographic depiction of the tube is also facilitated when it contains intraluminal fluid (Goldstein, 1988). The Sion Procedure entails filling up the pouch of Douglas with about 300 ml of sterile normal saline; not only is the patency visualised but also the mobility, the fimbriae and any tubal adhesion. We have 67 patients on whom a hysterosalpingography, a diagnostic laparoscopy and our procedure have been done. We find our procedure an excellent tool for investigating the tubal status. The exact technique of both "The Sion Test" and the Sion Procedure as well as the fallouts of endosonography are described in the text.

#### **MATERIALS & METHODS**

Sixty-seven patients were chosen from the Gynaecologic O.P.D. of the Lokmanya Tilak Municipal General Hospital, Sion, Bombay.

The present on going study began in January 1991. The data presented in this paper is an analysis upto September 1991 and consists 67 infertile patients as yet on whom a diagnostic laparoscopy, hysterosalpingography and Sion Procedure were done. It includes fifty cases of primary infertility and 17 cases of secondary infertility.

A detailed history was taken and the nature and duration of infertility was noted. After performing the other routine investigations for infertility, the tubal status was evaluated by the Sion Procedure in the preovulatory phase of the menstrual cycle. Hysterosalpingography was carried out the next day using Conray 280, a water soluble dye. Diagnostic laparoscopy was performed in the secretory phase soon after the hysterosalpingography under general anaesthesia. A comparison of the reliability of the findings with these three different modalities of evaluating the tubal status was done after analysing the collected data.

#### **The Sion Procedure**

We are using the ATL Ultramark 4 machine which has realtime / 2-D sector and linear imaging modes alongwith M mode and Duplex Doppler capability with documentation by multiformat camera and videocassette recorder. We use the 5.0 MHz vaginal transducer. The patient is atropinised and the procedure explained to her. After a pelvic examination, the patient is brought to the edge of the table and an 8F Foleys catheter is inserted to just beyond the internal os and 3 ml of saline is injected into the Foleys bulb thus stabilising the catheter within the uterine cavity. At this point, the patients usually complain of a dull lower abdominal pain. A condom is slipped over the probe before each examination for reasons of hygiene and readiness for the next patient. A small amount of coupling gel is applied to the inner surface of the top of the condom to assure contact. Once the preparation is complete, the sonographer gently inserts the transducer into

the vagina with the marker pointing anteriorly towards the pubic symphysis. After scanning the uterus, left ovary and right ovary we go back towards the left ovary and concentrate on an area between the left cornu of the uterus and the left ovary. About 20 ml of saline alongwith air is pushed through the Foleys catheter and the left tube if patent distends and the mixture of saline and airbubbles gush past the surprised ovary - the spectacle is named 'The Waterfall Sign'. The test is repeated on the right side. This only accomplishes what we have designated to be "The Sion Test" (Allahabadia et al, 1991). We now continue to inject sterile normal saline uptil about 300 ml have flooded the pelvis. Now, with the adnexa and the uterus submerged in a fluid medium, we start a thorough rescanning of pelvis again. If there is a bilateral tubal block and reflux of saline is seen in the stem of the foleys catheter then we proceed to fill up the pelvis by alternative means. In six patients we have used an 18 guage needle inserted per abdomen through the suprapubic region after local infiltration using 2% xylocaine to inject 350 ml of sterile normal saline into the pelvis with all aseptic precautions.

After the pelvis is flooded with saline, the probe is inserted within the vagina and manipulated around the cervical lips and into the fornix so as to depict the structures of interest in best detail. When the transducer is oriented in the longitudinal or saggital plane, the long axis of the uterus can usually be depicted by slight angulation off midline. The uterus is used as a landmark for depiction of other adnexal structures. Once the uterus is identified, the probe is angled to the right or left of midline in the saggital plane to depict the ovaries. The internal iliac artery and vein appear as tubular structures along the pelvic sidewall. Low level blood echoes can be seen streaming within these pulsating vessels. The ovaries typically lie medial to them. After appropriate images are obtained in the saggital

plane, the transducer is turned 90° to depict these structures in their axial or semicoronal planes. When surrounded by fluid, the normal tube appears as a 1 cm tubular echogenic structure that usually comes from the lateral aspect of the uterine cornu posterolaterally into the adnexal regions and cul-de-sac (Goldstein, 1988). With the normal tube in view, we now inject 20 ml of a mixture of air and saline once again and now the flaring of the fimbriated end of the tube can be appreciated in some patients, as it approximates its nearby ovary as if in slow motion (Figure 1). The movement of the fimbrial end in saline is akin to that of a fish moving under water! If there is a partial spill with peritubal adhesions we can see the gradual exit of saline and air as also flimsy adhesions in the adnexal region (Figure 2, Figure 3) and loculated spill with thick septae in the periadnexal region (Figure 4). If both the tubes are blocked, even then the saline injected perabdomen fills up the pelvis and delineates all sorts of adhesions; flimsy and dense; even multiple thick septae in the periadnexal regions are depicted absolutely clearly. All these adhesions and septae are seen in active motion as also the tubes. It is as if a new underwater world exists



Fig. 1 : A close-up view of the free floating fimbrial end.



Fig. 2 : Arrows points to a flimsy adnexal adhesions.

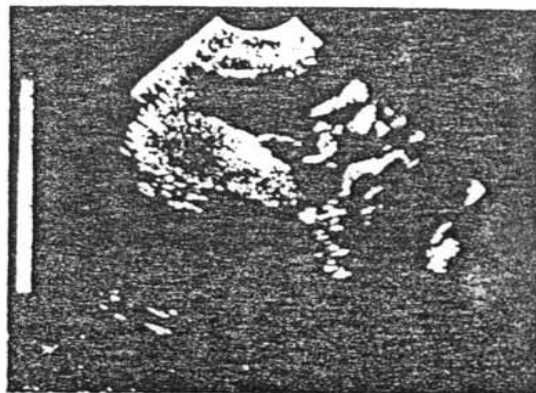


Fig. 4 : Loculated spill with thick septae in the peritubal region.



Fig. 3 : Flimsy peritubal adhesion.

with the use of this medium. With increasing practice and experience; even minor tubal disorders, particularly thickened or abnormally dilated fallopian tubes can be picked up. This is particularly helpful in distinguishing inflammatory disorders such as tubo-ovarian masses from simple hydrosalpinx. The relative mo-

bility of the pelvic organs can also be assessed when the probe comes into contact with the uterus or ovary.

After the completion of the Sion Procedure the patient is allowed to rest for 2-3 hours and whenever she is comfortable she is discharged on a seven day course of Ampicillin & Metronidazole. In our series there have been no complications and no morbidity like fever etc. Figure 5 shows a transabdominal scan done at the completion of the Sion Procedure showing free fluid in the pouch of Douglas.

#### OBSERVATIONS & RESULTS

Table - I only compares the accuracy of the three modes of investigation as far as tubal patency is concerned. While comparing the three methods, it was seen that regarding the bilateral tubal patency, there was agreement in 79% of cases. Regarding tubal block there was agreement in 16% of cases. Hence, there was, on the whole, agreement in 95% of cases.

What we are concentrating on is the tubal status as a whole and that includes information about the mobility and milieu exterior as well.

Table - I

Accuracy of tubal patency comparing three different investigatige modalities

Method	Tota No. of Cases	Bilaterally Patent Tubes	Bilaterally Blocked Tube	Left Sided Block	Right Sided Block
Sion procedure	67	55	6	3	3
HSG	67	53	10	3	1
Laparoscopy	67	56	7	3	1

Three cases which elucidate the usefulness of our procedure and highlight its minimally invasive nature are as follows :

Mrs. A. K. a case of secondary infertility showed no spill bilaterally on laparoscopy and further, the pelvis was filled with dense as well as flimsy adhesions. The Sion Procedure confirmed the multiplicity of adhesions and further demonstrated poor mobility of tubes with a left sided partial spill. HSG showed bilateral terminal hydrosalpinx with bilateral localised spill with 'halo sign' suggestive of peritubal adhesions.

Mrs. U. M., a 25 year old patient with primary infertility had an HSG showing a leftsided midsegment block with rightsided free spill. On laparoscopy, the additional findings were a thickened right tube with dense left sided peritubal adhesions. The Sion Procedure not only confirmed the findings of laparoscopy but also showed that the left ovary not visualised separately on laparoscopy was normal with no obvious pathology.

Mrs. J. S., a case of secondary infertility had undergone an exploration with adhesiolysis 10 years back. At the time of exploration, bilateral patent tubes were demonstrated. An HSG done recently demonstrated bilateral free spill but with evidence of terminal dilatation. On laparoscopy there were many flimsy adhesions seen and a right terminal hydrosalpinx was noted along with bilateral free spill. In this

particular case, the Sion Procedure showed no spill on the right side. But both the ovaries were given a clean chit by our procedure. Flimsy adhesions were picked up as also thickened septae and loculated fluid filled areas in the region of the right adnexa. On the left side, even the fimbrial motion was picked up clearly showing free spill.

#### DISCUSSION

Transvaginal ultrasonography was first practised by veterinarian surgeons, who introduced conventional ultrasonic transducers into the vagina of large animals, for better visualisation of the pelvic structures (Sidhva, 1990). It has been in wide use for some years now, though it is only recently, introduced in this country. Sharma (1989) used abdominal ultrasound for establishment of fallopian tube patency, but his technique using normal saline and assessing the pouch of Douglas could not indicate the side of the patent tube. Goldstein (1980) said "While many clinicians still consider endovaginal scanning a subspeciality of ultrasound imaging, more of them should come to accept it as an office procedure to be done in conjunction with a pelvic examination." Allahbadia et al (1991) reiterated that "The Sion Test" can be performed at the same time as the pelvic examination is done in the gynaecologist's office. According to them, the cornerstone of

its utility is : 1) each tube can be assessed separately visualising "The Waterfall Sign" on each side independently 2) The empty urinary bladder will save time and be better tolerated by the patient 3) The clear resolution of the transducer in the near field. Malpani (1991) adds that patients are much more willing to accept an examination done with a vaginal probe when this is performed by the gynaecologist himself. While the use of the vaginal scanner does require training and experience, this can be easily acquired by gynaecologists who are very familiar with pelvic anatomy. The visual record of the ultrasound study can give instant co-relation to the traditional bimanual examination. According to Saraiya (1991) a bimanual examination is irreplaceable but ultrasound is a great help because this approach offers additional information and helps solve many problems. The use of HSG and laparoscopic tubal assessment to confirm the findings obtained by transvaginal ultrasound appear to be the unique feature of this study since to our knowledge no previous researchers have utilised this novel approach. The authors offer The Sion Procedure not as a substitute for laparoscopy, hysterosalpingography, hysteroscopy or salpingoscopy, but as a screening procedure which is cheap, minimally invasive, simple and the entire procedure could be performed in the gynaecologists office in 10-15 minute only. The patient does not require any sedation or general anaesthesia; no hospitalisation, is more appealing to the patient's psyche with use of a non-irritant physiologic medium and definitely more cost-effective in the long run to an institution or individual. Its value in the evaluation of adnexal masses include demonstration of origin and internal consistency as well. Our procedure was comparable to diagnostic laparoscopy in the detection of peritubal adhesions and mobility of tubes. In addition it could also give us information about adnexae completely engulfed in dense adhesions. A recent paper from the Methodist Hospital of

*Gynec. 161;1530:1991.*

*Saraiya U. B. Bombay Hosp. 33;137:1991.*

Indiana indicates that a similar ultrasonographic technique using color doppler is being evaluated in the United States of America (Peters and Coulam, 1991) and the authors favour this 'easier, cheaper and more convenient method for assessing the anatomy of the upper female genital tract in the evaluation of the infertile couple'.

We should like to believe that the 'fallouts' of the Sion Procedure would be the popularisation of endovaginal ultrasound. We are convinced that endovaginal ultrasound will be used in every laboratory or office performing obstetrical or gynaecological ultrasound. It will complement many of our traditional transabdominal studies; it will open new horizons in imaging the cervix, the endometrium and the ovary; it will allow a whole new set of possibilities for ultrasonically guided procedures through the vagina (follicle retrieval, cyst puncture, selective termination, methotrexate or potassium chloride infusion into ectopics). The technique also offers promise as a potential screening tool in the post-menopausal state looking for malignant disease. Another proposed use of the Sion Procedure is its utility at the time of hydrotubation after a tubal recanalisation where it will give the surgeon a visual documentation of his operative results.

#### ACKNOWLEDGEMENTS

The authors would like to thank Dr.(Mrs.) S. S. Deshmukh, Dean, Lokmanya Tilak Municipal Medical College & General Hospital, Sion, Bombay for giving permission to use the hospital data.

#### REFERENCES

1. Allahbadia G. N., Nalawade Y. V., Patkar V. D., Niyogi G. M., Shah P. K.: *Bombay Hosp. J.* 33;23:1991.
2. Goldstein S. R. *ultrasound 1st Edition, Alan R. Liss, Inc. USA, 1988.*
3. Goldstein S. R. *Contemporary Obstet. & Gynec.* 31;54:1980.
4. Malpani A. *Bombay Hosp.* 33;137:1991.
5. Peters A. J., Coulam C. B. *American J. Obstet. &*
7. *Si Iltva S. J. Bombay Hosp.* 32;57:1990.
8. *Sharma R. R. J. Obstet. & Gynec. India* 39;700:1989.